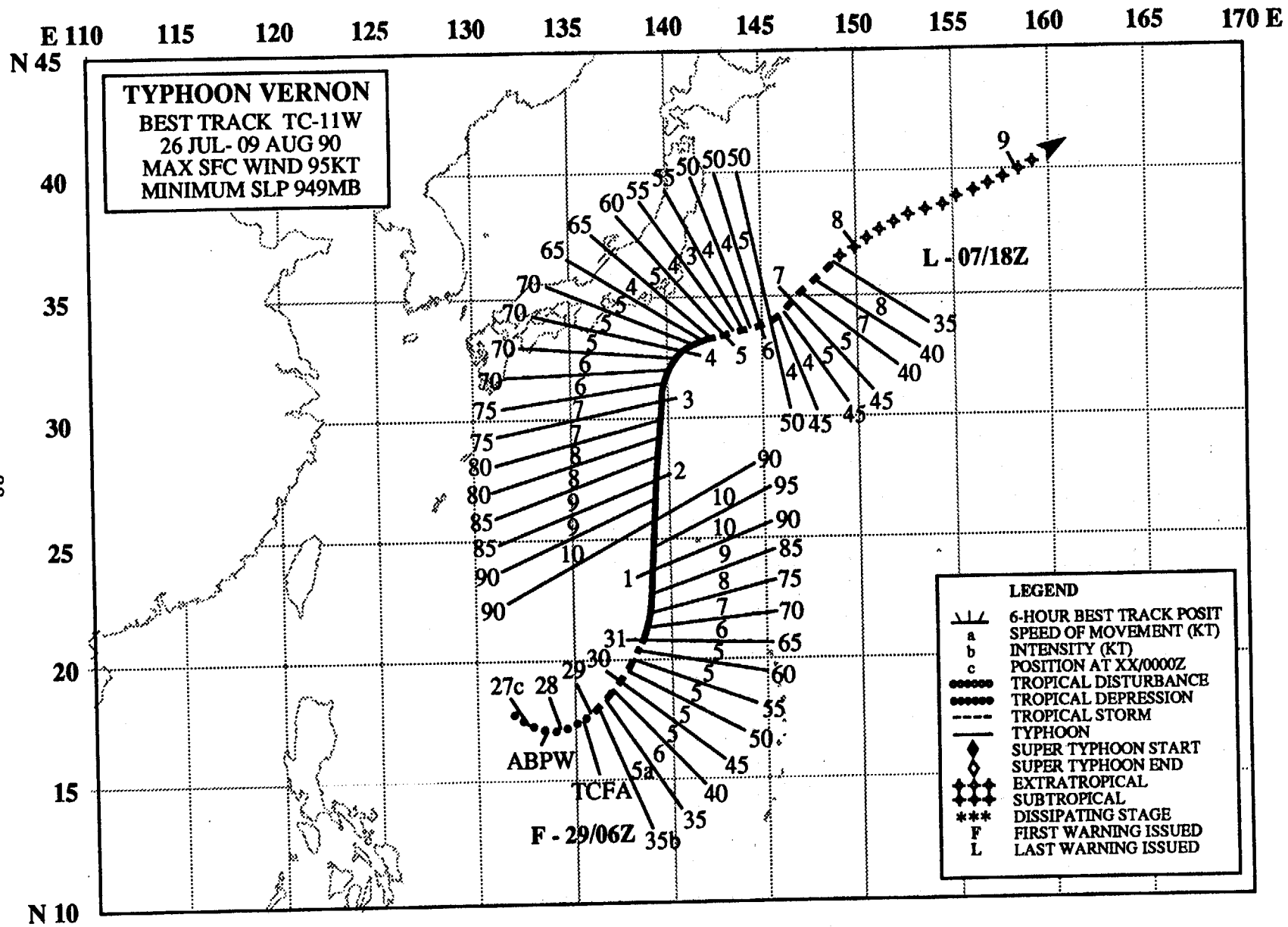
TYPHOON VERNON
BEST TRACK TC-11W
26 JUL- 09 AUG 90
MAX SFC WIND 95KT
MINIMUM SLP 949MB
E 110
115
120
125
130
135
140
145
150
155
160
165
170 E
N 45
40
35
30
25
20
15
N 10
L - 07/18Z
F - 29/06Z
ABPW
TCFA
LEGEND
6-HOUR BEST TRACK POSIT
SPEED OF MOVEMENT (KT)
INTENSITY (KT)
POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

88

TYPHOON VERNON (11W)

I. HIGHLIGHTS

Vernon, the last of four tropical cyclones to develop during July, was the last of a series of storms that included Tropical Storm Tasha (10W) and Typhoon Steve (09W) to form the only three-storm outbreak in the western North Pacific during 1990. Vernon followed Steve's northward-oriented track, as the monsoon trough underwent a major displacement to the north.

II. CHRONOLOGY OF EVENTS

271700Z - Significant Tropical Weather Advisory reissued to include a low-level cyclonic circulation in the monsoon trough with persistent convection and an estimated minimum sea-level pressure of 1004 mb.

282200Z - Tropical Cyclone Formation Alert issued for increased outflow and improved convective curvature.

290600Z - First warning followed consolidation of convection into two interlocking cloud bands.

291200Z - Upgraded to tropical storm after appearance of a ragged central dense overcast.

310000Z - Upgraded to typhoon based on eye development.

010600Z - Peak intensity - 95 kt (48 m/sec) - based on intensity estimate of CI 5.5 at 010300Z.

050000Z - Downgraded to tropical storm intensity due to the loss of central convection.

071800Z - Final warning - extratropical - issued as Vernon continued to lose its supporting convection.

III. TRACK AND MOTION

During the last week of July, the western portion of the active monsoon trough was anchored in Asia by Tasha (10W). The trough extended eastward across the Philippine Sea through Steve (09W) and north-northeastward to a mid-level cyclonic circulation east of Honshu (Figure 3-11-1). Vernon developed in the monsoon trough between these two tropical cyclones and moved slowly eastward along the trough axis on the edge of the deep southwesterly flow. The eastward track along the trough axis became more northward as the entire monsoon trough shifted northward throughout the week. As Vernon approached Japan, the Asian High persisted across Honshu, and Vernon was forced to slow and

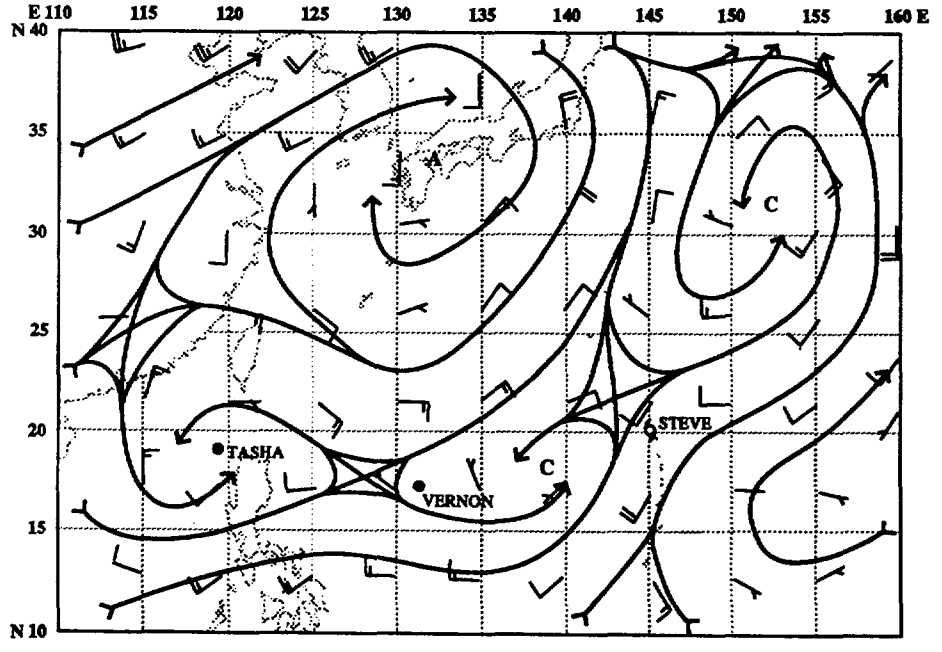

Figure 3-11-1. The 270000Z July NOGAPS 500-mb analysis shows the monsoon trough, extending eastward from Tasha (10W) through Steve (09W) to a low east of Honshu. Equatorward of the trough axis the deep southwesterly flow extends up through the middle troposphere. 84

track around the southern portion of the High. Vernon and Steve (09W) moved in a similar manner and maintained a separation of approximately 800 nm (1480 km) until Steve accelerated northeastward.

IV. INTENSIFICATION

Typhoon Vernon (Figure 3-11-2) intensified steadily despite the proximity to both Steve (09W) and Tasha (10W). The upper-level outflow from Tropical Storm Tasha, however, disrupted Vernon's vertical alignment. Only after Tasha dissipated over China on 31 July was Vernon able to develop into a typhoon (Figure 3-11-3). Approaching Honshu on 3 August, the eye of the typhoon became elongated along an east-west axis and lost much of its definition. After turning northeastward, Vernon (Figure 3-11-4) began a slow extratropical transition.

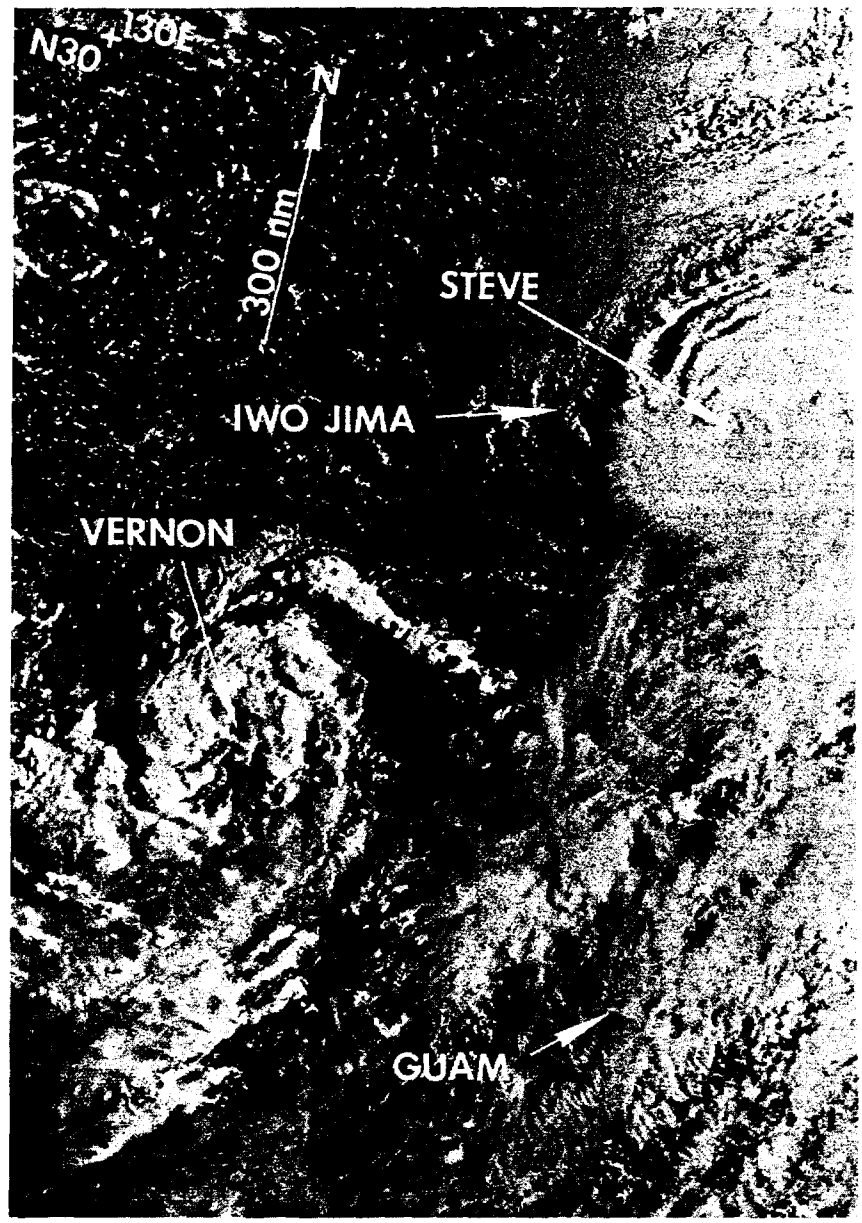

Figure 3-11-2. The tropical disturbance which became Typhoon Vernon develops approximately 700 nm (1300 km) southwest of Typhoon Steve (09W). The curved convective bands indicate the system is developing. A Tropical Cyclone Formation Alert was issued one hour after this image was received (282055Z July DMSP visual imagery).

V. FORECASTING PERFORMANCE

Due to their close proximity, forecasters initially considered the possibility of binary interaction between Vernon and Steve (09W). However, after rotation around a common midpoint was not observed, the binary interaction scenario was discarded in favor of a north-oriented forecast track similar to that taken by Steve three days earlier. The first nine forecasts (Figure 3-11-5) using this scenario were extremely accurate and had 72-hour mean forecast errors of less than 100 nm (185 km). As Vernon moved further north, forecasters experienced the same dilemma as with Steve (09W). The NOGAPS prognostic series indicated the subtropical ridge would build from the east, displacing the cyclone further west with landfall in the heavily populated areas of Japan. The forecasts were based on this guidance. As Vernon moved northward, the ridge built in from the east as forecast, but further to the south. At 040600Z August, it became evident that the mid-level ridge would hold across Honshu, and the forecast track was changed from northward to northeastward and away from Japan.

As a point of interest, the NOGAPS and JMA models had totally different prognostic solutions for the ridge motion across Japan. JMA retained the ridge and let Vernon move north-northeastward. NOGAPS linked the ridge over Japan with the maritime subtropical ridge to the east, and then moved the ridge off the island and over the Pacific. The NOGAPS guidance was used for the forecasts and the JMA guidance became the alternate scenario. In retrospect, the alternate scenario proved to be correct.

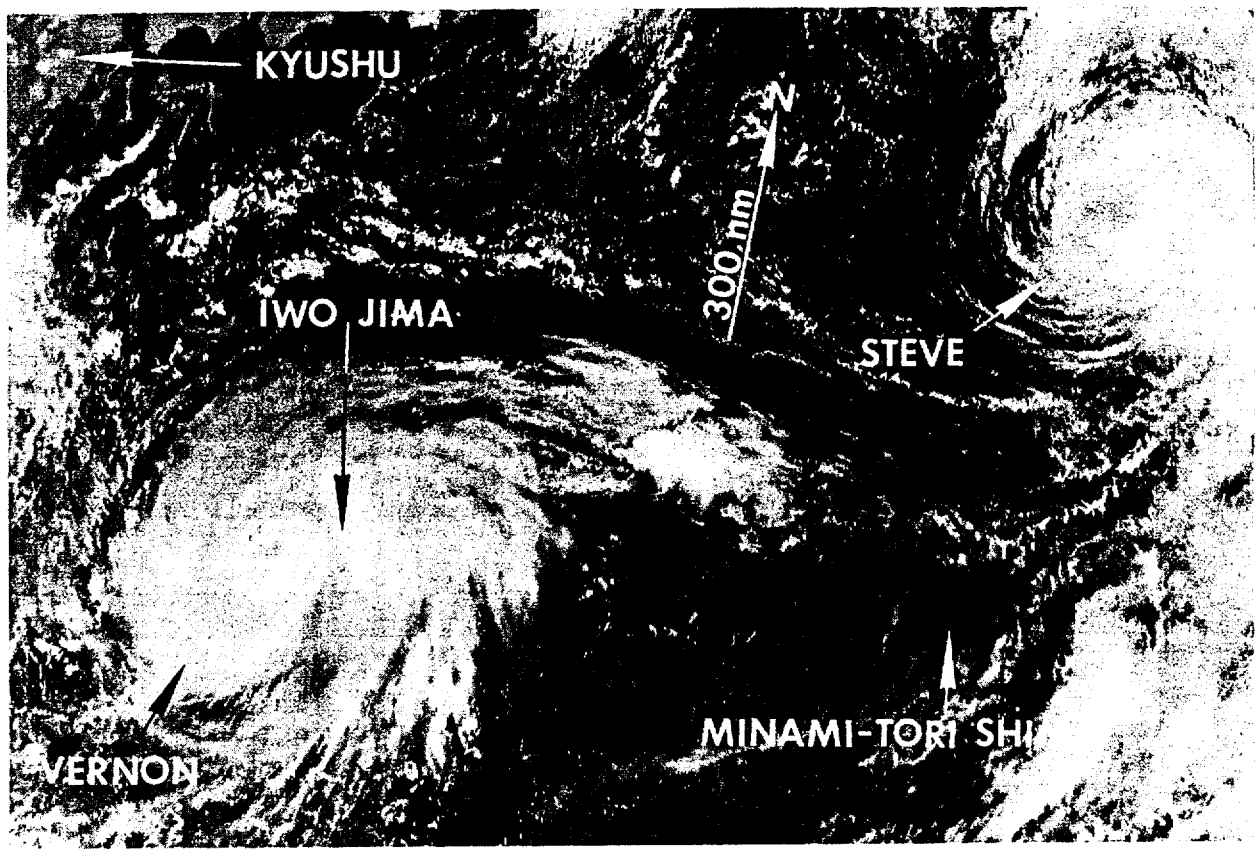

Figure 3-11-3. Typhoon Vernon near maximum intensity of 95 kt (48 m/sec). At this point, Vernon has a well-defined, but cloud-filled eye, and Typhoon Steve is weakening over water (312316Z July DMSP visual imagery).

VI. IMPACT

Although Typhoon Vernon threatened the Tokyo metropolitan area, it veered northeastward, passing within 120 nm (220 km) of the Japanese coast. There were no deaths or significant damage reports related to Vernon.

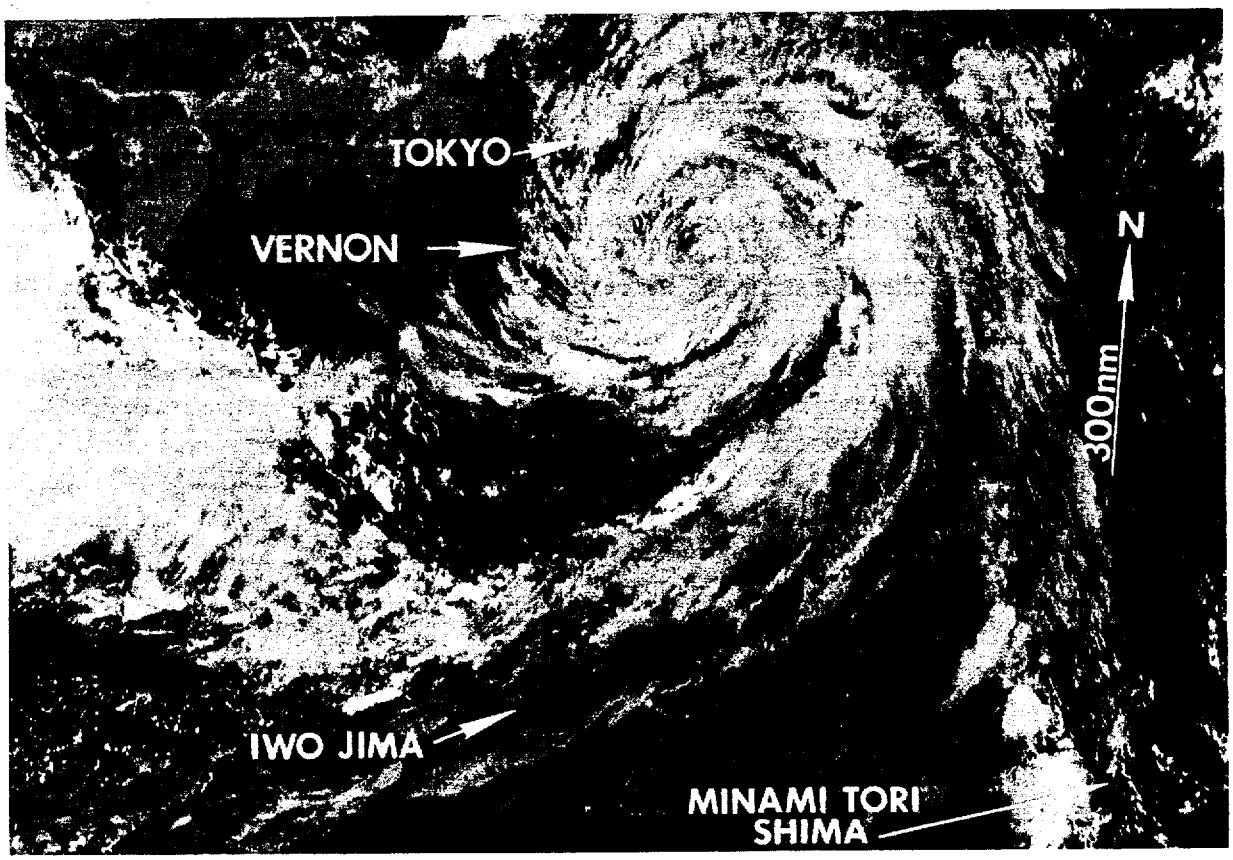

Figure 3-11-4. Vernon as it was downgraded to a tropical storm. Most of the deep central convection has diminished, leaving a well-defined low level circulation of stratocumulus and cumulus clouds (042333Z August DMSP visual imagery).

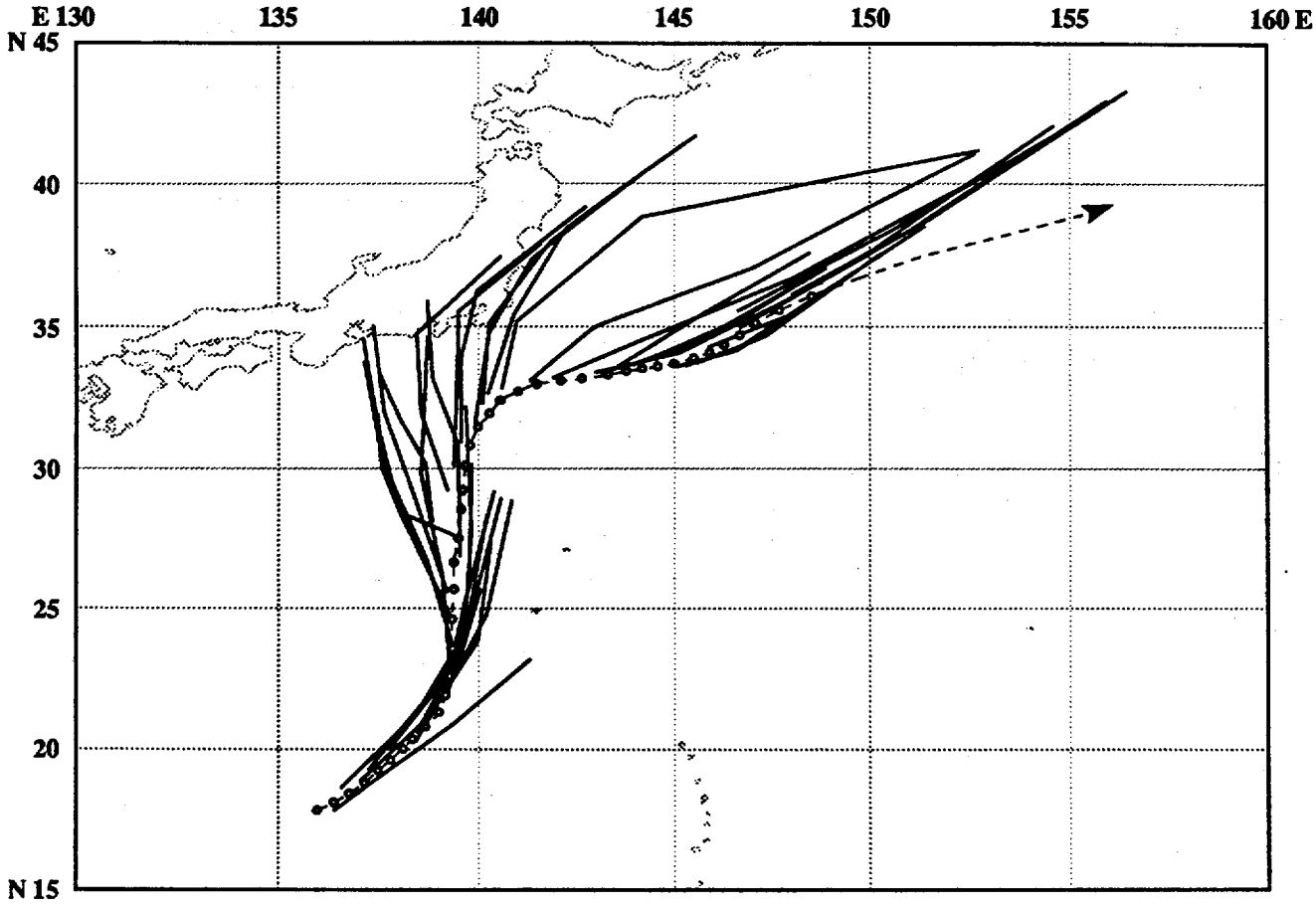

Figure 3-11-5. Summary of JTWC forecasts (solid lines) for Vernon (11W) is superimposed on the final best track (dashed lines).